

Soldiers *Online*

CRAFTING

Designs and concepts being studied in the Crusader self-propelled howitzer program will be used to develop new battlefield capabilities and build systems that fit soldiers' needs.

CRUSADER

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Story by CPT Amy Hannah

T EAM Crusader reached deep into the Army's muddy-boots units to form a group of the best field artillery NCOs to help develop the Army's future cannon artillery system.

Formally called the Crusader NCO Council, these soldiers work side by side with government representatives and industry engineers to improve artillery system design, from the user's point of view.

The Crusader NCO Council is assigned to the office of the U.S. Army Training and Doctrine Command's System Manager for Cannons at Fort Sill, Okla., and the office of the Program Manager for Crusader at Picatinny Arsenal, N.J.

Changing the Way the Army Fights

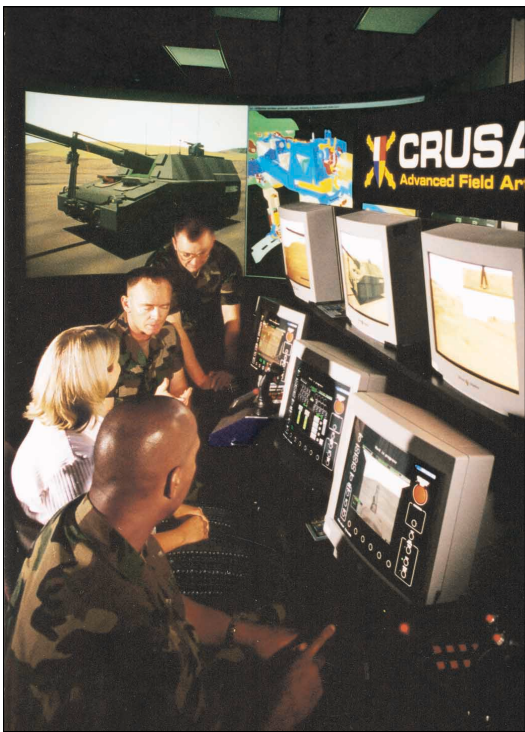
NCO Council member SFC Daniel Hallagin said the purpose of the Crusader program is to bring to the battlefield new capabilities that will change the way the Army fights.

Along with other council members, Hallagin is responsible for telling design engineers how soldiers would like the system to work and for ensuring that the specific function controls work in the manner in which soldiers might expect.

"My job is to influence the engineers' design work and push for what best fits the soldier," he said. "I need to make sure equipment is built so soldiers of all sizes can maintain and operate it.

"At first I was really skeptical of the system, Hallagin said. "All I saw was a congestion of moving parts and everything was mechanical. In my mind, the more mechanical a system is, the more it will break and be unreliable. But after working with the engineers on the project and watching them test and

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Soldiers discuss design requirements with human factors engineer Kelly Reischel.





MSG Joe Zanders discusses the operation of Crusader's crew egress hatch with system engineer George Ivey as other NCOs inspect the hatch.

Kris Duryea

troubleshoot the various components of the vehicles, I'm convinced Crusader will work in the field, just as it is right now at Yuma Proving Ground."

Not Your Father's Howitzer

The Crusader team is designing what they describe as the most sophisticated weapons systems under development today.

The complete Crusader includes a self-propelled 155mm howitzer and its companion resupply vehicles. The

SPH is significantly more capable than the current M109A6 Paladin howitzer it will replace, developers say.

Full automation, a liquid-cooled cannon, on-board projectile-tracking radar, state-of-the-art engine and transmission, drive-by-wire control, embedded command and control, and embedded training are some of the important features included in the SPH package.

Two versions of the RSV will be fielded with the Crusader system, providing increased operational flexibility and enhancing survivability

White said that new systems like Crusader will "increase force effectiveness, reduce friendly casualties, ease logistics support requirements and improve deployability."

and sustainment. The tracked version, RSV(T), is a self-propelled armored vehicle with significantly increased capabilities over the system it will replace, the M992 Field Artillery Ammunition Support Vehicle. The wheeled version, RSV(W), is based on the Palletized Load System truck and will have a resupply module that can operate on the truck, or be removed and shipped separately.

"Crusader carries with it technology that we're going to want in the Objective Force," said Army Secretary Thomas E. White. "It's robotic, it's fully digital, and it comes with a three-man crew. About a battery of Crusader will be worth at least a battalion of Paladin, so it is very efficient from a lift perspective."

In a recent statement before Congress, White said that new systems like Crusader will "increase force effectiveness, reduce friendly casualties, ease logistics support requirements and improve deployability."

Crusader's many proponents claim the new system will provide improved firing accuracy in all weather, at all times and, unlike howitzers in use today, will share battlefield intelligence with other ground forces, aircraft and ships. It will also enhance ammunition resupply operations with its automated transfer and continuous inventory management.

Crusader's designers envision that it will be far more survivable than current howitzers, use less ammunition to achieve the same training results, increase force effectiveness and improve cannon artillery effectiveness over the current system.

Soldier-first Design

To help make that happen, the NCO Council regularly meets with designers and engineers, and travels to sites around the country where different system components are being tested. Collectively, the NCO Council ensures that the contractor includes what is called MANPRINT — man-power and personnel integration — and Human System Integration into the Crusader design.

Survivability and responsiveness are top priorities for MSG Joe Zanders, who is responsible for helping Team Crusader maintain focus on the early and continuous identification and resolution of soldier issues involving operational doctrine, tactics, techniques and procedures.

His key concerns are for soldier safety, and to be sure that soldiers and equipment can function well together to maximize combat effectiveness, he said.

“Responsiveness applies to the ability Crusader has to more quickly receive a fire mission, follow it out and move on to the next scenario,” said Zanders. “It’s important that the system be the most technologically

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SFC Michael Wood (left) and SFC Daniel Hallagin inspect projectile magazines.

equipped possible.”

SFC Randy Ruth is responsible for maintenance and logistics, and related MANPRINT issues, on the Crusader system. He has already influenced the system design in several key areas, including packaging of system hardware, and system maintainability and supportability.

“This was my one chance to help

soldiers have a more sophisticated technological weapons system than they have ever had in field artillery,” said Ruth.

“Because we have upfront influence on the design and development process, we can give design engineers

Soldiers conduct a simulated fire mission in Crusader’s Crew Station Trainer.

Kris Duryea





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Crusader engineer intern Kevin Boll discusses the system's diagnostic capabilities with SFC Randy Ruth and Hallagin.

direct feedback," he said.

Ruth said that with the Army's current self-propelled howitzer, soldiers go through the preventive maintenance checks process with a handbook and must check all equipment, even though it may be working properly. It's a time-consuming process that keeps the crew from focusing on other essential tasks.

Ruth said Crusader engineers have embedded an interactive process directly into Crusader software, so that when the Crusader is turned on, it automatically goes through a start-up process to let soldiers know exactly what needs to be checked and what procedures will fix any problems found.

"This is an incredible new technology that, when told what mission to complete, will alert the crew to any problems before taking action," Ruth said.

SFC Michael Wood ensures that the contractor addresses MANPRINT issues with specific focus on "how the cannoneer interfaces with the system." He provides what he calls the "reality check" for system engineers.

Hallagin coordinates soldier issues in the command, control, communications, computers and

intelligence technical area.

This includes providing input on how the soldier interfaces with the system through the internal displays and controls, and through the interface with external C4I systems.

The Jury's Out

One essential way these NCOs ensure the Crusader program is on target is by overseeing the implementations of the "user jury" process to review various aspects of the system.

User juries consist of expert field artillery soldiers who provide suggestions, select the best option from several choices or validate the design decisions made by the engineers. User juries are called in

continuously, and their ideas are presented directly to the engineers in charge of the designs. The goal is to create a system designed for the end user by the end user.

Soldiers involved in user juries are able to evaluate proposed design solutions while they are in development, using sophisticated computer simulations created in the Visual Integration Lab provided by United

Defense Limited Partnership of Minneapolis, Minn. UDLP is the prime contractor hired to design and build Crusader.

In the VIL, soldiers sit in a mock-up of the crew area and, with human-factors engineers, go through intensive studies. The resulting information is then provided to the design engineers.

The soldiers practice such tasks as driving or firing the gun. They then give feedback on various aspects of the system, including how they want to view the battlefield situation, where they want the controls to be, how they want the system to function and what the different computers should display.

As a former Paladin platoon sergeant, Wood has a cannoneer's perspective on how howitzers operate. The VIL and other development devices give him the opportunity to apply that experience to improving user functionality with the Crusader.

"In my training experience with the Paladin, I noticed some areas where improvements could be made, especially relating to the cannoneer," said Wood. "The loader quickly becomes fatigued in battle because he's picking up rounds, carrying them and loading them, and he doesn't have the luxury of a replacement."

Wood said he's impressed with Crusader's increased system survivability and crew sustainment. Important elements include an air-conditioned interior, automated ammunition processing, and an outer system that protects from chemical and biological threats.

Wood said some of these improvements mean soldiers won't have to wear MOPP gear inside the cockpit because they'll be operating in the "shirt-sleeve environment," and they will never handle ammunition or propellant after the resupply vehicle is uploaded.

These and many other elements of the new Crusader system are a result of soldier input provided by previous studies, the user juries and the NCO Council, Ruth said.

"NCOs know the scenarios under which soldiers must operate, and they bring the core knowledge and experience in field artillery to the engineers," he said. □

Kris Duryea



Ruth and Wood inspect propellant increments after cycling through the vehicle.